CLAIMS

1. A charged particle beam apparatus comprising a charged particle beam source for directing a charged particle beam along a beam path in a downstream direction to a target, and a processing station that defines a target chamber, the processing station comprising a chamber divider which divides the target chamber into upstream and downstream regions during charged particle beam processing of the target, the target being located in the downstream region and the divider having an aperture therethrough sized to permit passage of the charged particle beam to the target without substantial blockage and to limit backflow of gas into the upstream region of the chamber.

2. A charged particle beam apparatus as defined in claim 1 further comprising an aperture adjustment mechanism for adjusting the size of said aperture.

3. A charged particle beam apparatus as defined in claim 2 wherein said aperture adjustment mechanism comprises one or more movable plates.

4. A charged particle beam apparatus as defined in claim 3 wherein said aperture adjustment mechanism comprises a pair of plates defining opposite sides of said aperture and movable toward and away from each other.

5. A charged particle beam apparatus as defined in claim 4 wherein said aperture adjustment mechanism further comprises a drive mechanism for moving said plates toward or away from each other to adjust the aperture size.

6. A charged particle beam apparatus as defined in claim 5 further comprising a beam sensor configured to produce a signal indicative of beam impingement on said plates, wherein said drive mechanism is responsive to said signal to adjust the aperture size to the beam size.

7. A charged particle beam apparatus as defined in claim 2 wherein said aperture adjustment mechanism comprises one or more rotatable panels.

8. A charged particle beam apparatus as defined in claim 2 further comprising a beam sensor configured to produce a signal indicative of beam size, wherein the aperture adjustment mechanism is responsive to said signal to adjust the aperture size to the beam size.

9. A charged particle beam apparatus as defined in claim 2 further comprising a beam sensor located downstream of the chamber divider to produce a signal indicative of beam current passing through said aperture, wherein the aperture adjustment mechanism is responsive to said signal to adjust the aperture size until a reduction in beam current is detected.

10. A charged particle beam apparatus as defined in claim 1 further comprising a vacuum pump for maintaining pressure within the upstream region of the target chamber at $5x10^{-6}$ torr or less during operation.

11. A charged particle beam apparatus as defined in claim 1 wherein said divider is located within said target chamber such that all beamline components are upstream of the divider.

12. A charged particle beam apparatus as defined in claim 11 further comprising a beam current sensor within the upstream region of the target chamber.

13. A charged particle beam apparatus as defined in claim 1 comprising two or more dividers disposed successively in the chamber, each having an aperture.

14. A charged particle beam apparatus as defined in claim 13 wherein the size of each aperture is adjustable by an aperture adjustment mechanism.

15. A charged particle beam apparatus as defined in claim 13 wherein each divider has an associated vacuum pump for maintaining vacuum within the region of the chamber immediately upstream thereof.

16. An ion implanter comprising:

an ion source for directing an ion beam along a beam path toward a target;

a mass analyzer disposed along said beam path for selecting desired ions in said ion beam;

an accelerator disposed along said beam path for accelerating the selected ions in said ion beam to desired energies;

a scanner for distributing the ion beam over the target; and

a processing station that defines a target chamber, the processing chamber comprising a divider which divides the target chamber into upstream and downstream regions during ion implantation of the target, the target being located within the downstream region and the chamber divider having an aperture therethrough sized to permit passage of the ion beam to the target without substantial blockage and to limit backflow of gas into the upstream region of the chamber.

17. An ion implanter as defined in claim 16 wherein said processing station further comprises an aperture adjustment mechanism for adjusting the size of said aperture.

18. An ion implanter as defined in claim 17 wherein said aperture adjustment mechanism comprises one or more movable plates.

19. An ion implanter as defined in claim 16 further comprising a first vacuum pump coupled to the upstream region of the target chamber and a second vacuum pump coupled to the downstream region of the target chamber.

20. A method for reducing the probability of beam-altering collisions between an ion beam and a gas within a target chamber of an ion implanter, the target chamber being adapted for enclosing a target having photoresist thereon, the method comprising providing a divider within the target chamber which divides the target chamber into upstream and downstream regions during ion beam processing of the target, the target being located within the downstream region and the chamber divider having an aperture therethrough sized to permit passage of the ion beam to the target without substantial blockage and to limit backflow of gas into the upstream region of the chamber.

21. A method as defined in claim 20 wherein the beam path configuration is adjustable and the divider aperture size is adjusted to the size of the beam path as the beam path configuration is adjusted.

22. A method as defined in claim 20 wherein the chamber divider is located such that the final energy of the beam is determined and the ion current is measured before the beam passes through said aperture.

23. An ion implanter for implanting ions into a semiconductor wafer, comprising:

an ion beam generator for generating an ion beam;

a processing station that defines a target chamber for receiving the ion beam, the processing station including a divider for dividing the target chamber into upstream and downstream regions during ion implantation of the semiconductor wafer, the semiconductor wafer being located in the downstream region, the divider having an aperture sized to pass the ion beam without substantial blockage and to limit backflow of gas from the downstream region to the upstream region; and

first and second vacuum pumps coupled to the upstream and downstream regions, respectively, of the target chamber.

24. An ion implanter as defined in claim 23 wherein said processing station further comprises an aperture adjustment mechanism for adjusting the size of said aperture.

25. An ion implanter as defined in claim 24 wherein said aperture adjustment mechanism comprises one or more movable plates.